



E.I. Du Pont de Nemours & Co–Northwestern University–The Dow Chemical Company CAT

Overview

The DND-CAT is a team of senior scientists and engineers formed jointly by the E.I. Du Pont de Nemours Co., Northwestern University, and the Dow Chemical Company to develop, build, and operate facilities dedicated to advancing x-ray research on new materials. The ability to characterize the increasing numbers of new and advanced materials with specifically engineered properties is closely coupled with the ability to analyze their molecular structure.

Research Focus

The scientific thrust of DND-CAT is concentrated in three main areas: the study of the atomic structure of bulk materials, the study of two-dimensional atomic structures (e.g., surfaces, interfaces, and thin films), and polymer science and technology.

Atomic Structure of Bulk Materials

In addition to crystallographic determinations of unknown compounds, this aspect of DND-CAT's program concentrates on the determination of defects and local atomic arrangements in materials. For example, the arrangement of dopant atoms and other lattice defects in metals, catalysts, and semiconductors is under study. In addition, DND-CAT researchers are extensively studying catalysts under realistic conditions of high temperature and pressure. Catalysts of interest include supported metal and bimetallic catalysts (e.g., Pd, Pd-Re), zeolites, and catalysts for environmentally benign chlorofluorocarbons.

Study of Two-Dimensional Structures

The structure of surfaces at interfaces is a primary factor controlling the properties of materials in many technologically important applications. Some of these include catalysis, corrosion, tribology, crystal growth, and ion transport through biomembranes. DND-CAT researchers will use a custom-designed ultra-high-vacuum system to study buried interfaces, thin films, and surfaces to determine mechanisms of film growth, segregation at grain boundaries, surface melting, and other two-dimensional phenomena.

Polymer Science and Engineering

The third major area for DND-CAT is polymer physics, chemistry, and engineering. Areas of interest include solution characterization of polymers and their precursors, structure formation, polymer melt rheology, fiber formation, structure/property/processing relationships, and mechanical properties.

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